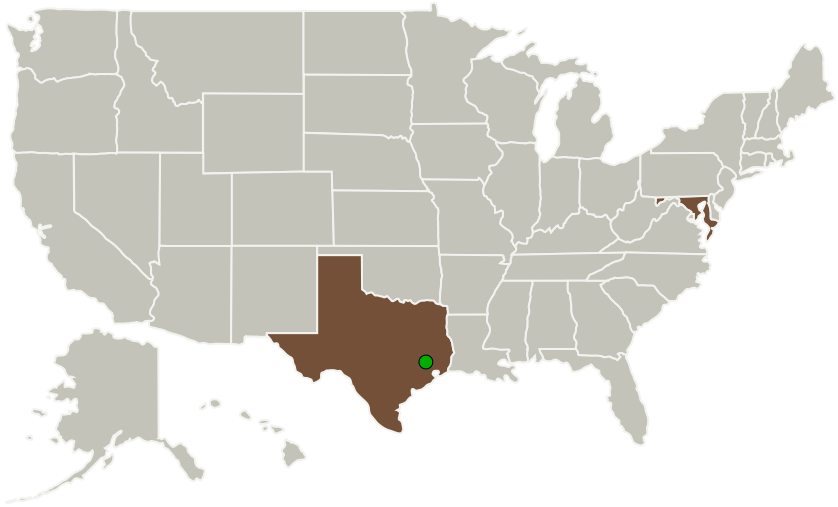
Innovative EVA Glove Exoskeleton, Phase I

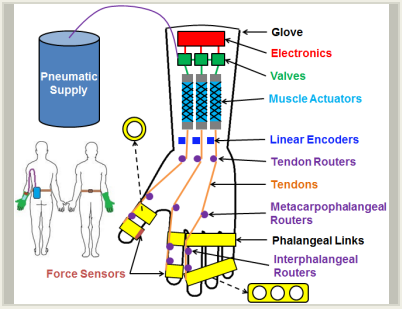
Completed Technology Project (2014 - 2014)

Project Introduction

Dexterous performance degradation resulting from donning an extra-vehicular activity (EVA) glove limits the capability of astronauts to perform certain tasks in space. This measurable performance loss has led to a number of design revisions, but barehanded performance with an EVA glove on is still far from achievable. Exoskeleton concepts have also been considered to add some of the lost dexterous capability, but technology and design challenges have limited their practical utility. As such, InnoVital Systems, Inc., in collaboration with the Space Systems Laboratory of the Aerospace Engineering Department at the University of Maryland, proposes to develop an innovative EVA glove exoskeleton for increased performance capability. The proposed concept will employ the team's novel, miniature pneumatic artificial muscles to drive the multiple degrees of freedom of the hand to restore the functionality lost by wearing the EVA glove. Building upon our experience in actuation, control, and space suit systems, as well as biomimetic applications, we will perform design, analysis, and fabrication in Phase I of the project, which will end with preliminary prototype testing and feasibility demonstrations. Phase II will focus on further design refinements, controls system development, and full-scale prototype development and testing.

Primary U.S. Work Locations and Key Partners





Innovative EVA Glove Exoskeleton Project Image

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Organizations Performing Work	Role	Type	Location
InnoVital Systems, Inc.	Lead Organization	Industry	Beltsville, Maryland
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Maryland	Texas

Project Transitions

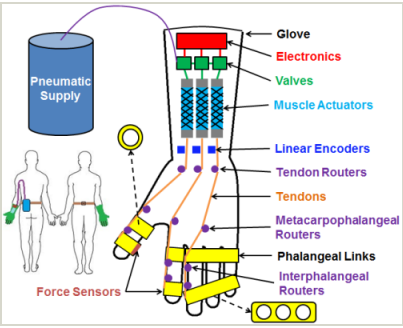
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137587)*

Images



Project Image
Innovative EVA Glove Exoskeleton Project Image
(https://techport.nasa.gov/image/126440)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
InnoVital Systems, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

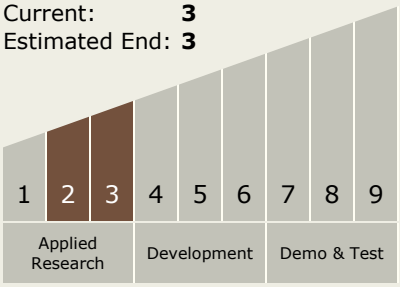
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Curt Kothera

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.1 Pressure Garment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System